Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

THE ILL HEALTH OF CHARLES DARWIN: ITS NATURE AND ITS RELATION TO HIS WORK

BY W. W. JOHNSTON

EVIDENCE OF THE EXISTENCE OF ILL HEALTH

NO one can read the story of Darwin's life without being impressed with the frequent allusions to his ill health. In his *Autobiography*, in the *Reminiscences* written by his son, and in the collection of his letters these allusions are met with on almost every page. From the three sources mentioned I have abstracted forty-two pages of type-written matter which refer directly to this subject. The following quotation from the *Reminiscences* is a full and very clear statement of the state of Darwin's health:

> If the character of my father's working life is to be understood, the conditions of ill health under which he worked must be constantly borne in mind. He bore his illness with such uncomplaining patience, that even his children can hardly, I believe, realize the extent of his habitual suffering. In their case the difficulty is heightened from the fact that from the days of their earliest recollections they saw him in constant ill health. . . . It is, I repeat, a principal feature of his life, that for nearly forty years he never knew one day of health of ordinary men, and thus his life was one long struggle of the weariness and strain of sickness.

Darwin's letters to his scientific friends are full of references to persistent suffering and to the interruptions and delays that were caused by continued illness. The above extract, with others which the limits of this paper will not permit me to quote, show the continuity and extent of these sufferings from the year 1836, the date of his arrival in London after the *Beagle* voyage, until his death on April 19, 1882, a period of forty-six years. The story of these years is one of intense application to work and of unremitting suffering, and it was while reading the *Autobiography* that I became anxious to know the nature of this illness that lasted nearly half a century, an illness so severe as to make life a burden and yet which did not shorten life nor prevent the completion of the great work which made Darwin's name immortal.

Various opinions have been expressed by the friends of Darwin as to the nature of his illness. His continued sufferings were said to have been the result of prolonged seasickness and of inherited dyspepsia, but no rational or complete diagnosis of his disease with an explanation of its causes is on record. To give a name to the assemblage of symptoms so fully described in the *Autobiography* and the *Reminiscences* is the object of this paper.

HISTORY OF DARWIN'S ILLNESS

From the quotation given above it is clear that Darwin was ill and suffering during the whole of his working life, and especially during that period of it in which his best work was accomplished. But before attempting a diagnosis of his illness it is necessary, of course, to know something of its history and to study the character of the symptoms distinguishing it.

In early life Darwin was strong, much given to outdoor life and in the latter part of his school days passionately fond of shooting. "I don't believe," he says, "that any one could have shown more zeal for the most holy cause than I did for shooting birds." His father told him that "he cared for nothing but shooting, dogs, and rat catching."

His strong constitution and large frame he inherited from his father's family, which he most closely resembled. His grandfather, Dr Erasmus Darwin, died at 71, his father, also a physician, at 82, bequeathing to their descendant a tendency to long life. From them, too, he no doubt received in part at least the great brain capacity to which all his portraits bear witness.

By his unappreciative teachers he was considered an ordinary boy, though he "had strong and diverse tastes, much zeal for what interested him, and a keen pleasure in understanding any complex subject or thing." Natural objects interested him most, and this fact, perhaps, as well as the influence of father and family sent him to Edinburgh to study medicine. Attendance upon two very severe operations from which he rushed before their completion convinced him that he could never be a physician. This discouragement was hardly justifiable, and yet it is fortunate for science that his life was not confined to a strictly professional career.

The taking of clerical orders was considered by his father next best to the practice of medicine, and he was sent to Cambridge to start afresh and to make preparatory studies with this in view. "Here," he says, "the time as far as academical studies were concerned was as thoroughly wasted as at school and in Edinburgh." No pursuit was followed with half the eagerness and none gave him so much pleasure as collecting beetles, and his studies for the ministry made little headway.

The three years at Cambridge were, he thought, the most joyous of his life because "he was in excellent health and always in high spirits." Up to this time there had been no sign of ill health; his brain had not been taxed, and with the exception of collecting beetles and shooting birds he had done little serious work.

To those, however, who could appreciate him he had already shown the promise of his mind, and to Professor Henslow, who recommended him for the position of naturalist to H.M.S. *Beagle* on her projected voyage of study and discovery, is due the honor of having launched Darwin upon his career. Captain Fitzroy's objection to the shape of Darwin's nose was not allowed to stand in the way, and after some little hesitation the young man accepted the appointment and took the most important step of his life.

It was at Plymouth, while waiting, much depressed in mind, for the sailing of his ship, that the earliest symptoms in the long train which followed him through life first appeared. These symptoms were palpitation and pain about the heart. He was then 22 years of age, and it is easy to understand how, at this age, the mingled feelings of excitement and gloom on leaving home should have caused such nervous disturbances. He thought, however, that he had disease of the heart, but because he "expected to hear the verdict that he was not fit for the voyage," he would not see a physician. His ambition "to take a fair place among scientific men" urged him to go at all hazards and he sailed for South America two days after Christmas day, 1831.

During this voyage of five years we have no knowledge of Darwin's health except from himself, and his journal contains but few references to the subject. He speaks of being ill, of occasionally feeling so exhausted as to be compelled to rest, but there is no definite statement of symptoms. His power of endurance was evidently very great at this time, and it is mentioned by his son that, on the occasion of a shore excursion when all were suffering for want of water, Darwin "was one of the two who were better able than the rest to struggle on in search of it."

His son alludes to only one serious illness in South America. In this attack Darwin said that every secretion of the body was affected, but the symptoms were so ill-defined that his father, Dr Darwin, could not make a guess as to their nature.

The voyage began December 27, 1831, and ended on October 2, 1836. During the two years and three months between this latter date and his marriage in 1839, he was occasionally unwell. From his marriage until the date of his leaving London, a period of nearly three years, he had frequently recurring illnesses, one of them long and serious. He was losing ground year by year, and a geological excursion in Wales was the last that he had the strength to make. Increasing weakness, the inability to meet his scientific friends, to attend society meetings, and at the same time to carry out his plan of scientific work made him take the resolution to leave

London forever and to live in the country. This decision, next in importance to the *Beagle* voyage, had the most far-reaching influence on his life. Out of it grew the ability to complete *The Origin of Species* and the rest of his marvelous contributions to science.

The symptoms that appeared after settling at Down, his country home, are more characteristic than any before described in the *Autobiography*. They followed the excitement of receiving and conversing with friends and consisted of violent shivering with vomiting and giddiness. At times he was so giddy as to need an alpenstock to steady him even in the house. He was very sensitive to both heat and cold; if anything went wrong with his work he would complain of a sense of oppression from heat.

Insomnia was one of the most constant and most distressing of his symptoms. This varied with circumstances—"half an hour more or less conversation would make to him the difference of a sleepless night and of the loss perhaps of half the day's work." "He often lay awake or sat up in bed for hours, suffering much discomfort from the activity of his thoughts . . . his mind working at some problem which he would willingly have dismissed." Any departure from the regular routine of his life upset him, and he paid the penalty of suffering for every infraction of his self-ordered regime. "Anything that flurries me knocks me up afterwards and brings on a violent palpitation of the heart"—he wrote to a friend.

The early morning was the only time when he could make any exertion. "Towards evening his step was slow and labored, and mounting the steps was an effort."

Darwin soon learned to know that for increasing suffering there was but one remedy—a complete abandonment of all writing and absence from home and study. Thus began the habit of taking holidays. When about to leave home the making ready and the anticipation of the journey caused "a miserable, sinking feeling" that gave great disquiet but passed away as soon as the journey was begun.

As the years went by all invitations were refused; social life was practically given up and he rarely felt well enough to receive visits from scientific friends.

The allusions in his diary to the condition of bad health increased with the years and the holidays became longer and more frequent. In the earlier years fluctuations occurred, and at times he speaks of gaining ground, but by 1846 he was usually hopeless and much depressed by continued sleeplessness, indigestion, and prostration. By 1852 he rarely ever went to London, and during the succeeding years he was never free for a day from suffering. In 1859 he wrote that his health had "quite failed," that he had great prostration of mind and body, bad headaches, with frequent attacks of acute exhaustion; his work is spoken of as a burden from which he would gladly be freed. He was then often confined to the house for weeks at a time; he suspected that he would soon entirely fail and believed that he must husband the little strength left in order to finish his work. Everything unusual disturbed him; a conversation of two and a half hours with his nephew made him ill half the night. In 1863 he wrote that he had been very busy and uncomfortable from a feeling of fulness, slight pain, and tickling about the heart. These symptoms with those previously described continued during 1860, 1861, and 1863. In 1864 appears the entry, "Ill all January, February, March."

There is very little doubt that these casual allusions to illness during these 27 years do not give an exaggerated picture of the suffering endured. Nor does the calm and well-balanced mind of Darwin justify the belief that the symptoms were imaginary, that he was simply an intellectual hypochondriac, distorting his feelings and creating pain where none existed. There is the positive testimony of his son that he suffered from insomnia, vertigo, an abnormal sensibility to heat and cold, dizziness, vomiting, sensations of distress about the heart, chronic indigestion, and prostration chiefly affecting the nervous system after mental strain. Monotony benefited him; unusual excitement broke him down.

His symptoms bore a close relation to the amount and character of his work; overwork or a long continuance of moderate work made him ill; rest from work made him better. But there was no radical improvement at any time; the changes for the better were only temporary; and he was pursued during the 27 years by a feeling of hopelessness and the dread that he would not live to finish the great task he had set himself to do. It is, however, a significant fact that he did live, not wasting much, preserving a fair amount of nutrition as his pictures show, and working with undiminished ardor and success during all this time.

The year 1864 was marked by a temporary improvement; but the change was without much effect on his despondency, as in this year he wrote: "I wonder so old a wornout dog as I am is not quite forgotten." The following year began with less ill health, for he seems to have given himself up to a greater degree of rest from work than before. From April to December he did practically no work with the exception of looking over *The Origin of Species* for a second French edition.

Through 1866 his health improved and in 1867 he wrote that he had rested and felt more himself. In this year he was busy with *The Descent of Man*, a work that exhibits the greatest industry and the fulness of his genius, and yet he was far from well, for on a visit to London he failed to keep half his engagements and was confined to the house for some time. On a visit to Wales in the same year he was ill and saddened because of his inability to wander over the hills as he had once done. He wrote a friend at this time: "I have been as yet in a very poor way; it seems as soon as the stimulus of mental work stops my whole strength gives way. As yet I have hardly crawled half a mile from the house, and then have been fearfully fatigued. It is enough to make one wish oneself quiet in a comfortable tomb." This is the story of the next two years. In June, 1870, he wrote that he had been better of late. In the next year he speaks of discomforts and miseries and of the inability to hear even much reading aloud.

Darwin was now, in 1872, sixty-three years of age. For the first time since the beginning of his illness a marked change for the better appeared, and during the last ten years of his life—from 1872 to 1882—"the condition of his health was a cause of satisfaction and hope to his family." His health showed signs of amendment in several particulars. There was less distress and discomfort, and he was able to work more steadily. It is a fair conclusion that this improvement was in great part due to the wise counsel of Sir Andrew Clark, who was at this time frequently consulted. His son says: "It was not only for the generously rendered service that my father felt a debt of gratitude towards Sir Andrew Clark. He owed to his cheering personal influence an often repeated encouragement, which latterly added something real to his happiness, and he found sincere pleasure in Sir Andrew's friendship and kindness towards himself and his children."

These last years were marked, then, by a general improvement. Work was continued intermittently. The symptoms connected with the nervous system were less distressing, but there was a certain loss of physical vigor with more frequent attacks of pain or uneasiness about the heart. He speaks at this time of the wearisomeness of life and of approaching death. On the 13th of December, 1881, he had the first of a series of attacks of angina pectoris. Irregularity of the pulse followed with attacks of faintness. In April, 1882, these symptoms were aggravated, and fainting attacks, from which he recovered with difficulty, recurred. During the night of the 18th there was a severe attack of this kind. He recognized the approach of death and said, "I am not in the least afraid to die." After much suffering from nausea and faintness death came on the next day, April 19, 1882. He was in his seventy-fourth year.

The life of Darwin can be divided into four periods, each one characterized by a different condition of health:

1. From birth to the age of 22. He was at this time in

excellent health, active-minded with keen sensibilities, devoted to outdoor life and exercise.

2. From the age of 22 to 27 — the period covered by the *Beagle* voyage. He was then strong, capable of bearing great physical fatigue, but taxing his mental and physical endurance to the utmost. Rare and sudden illnesses occurred, brought on by unusual strain on mind and body.

3. From his return to England in 1836 to 1872. This period of thirty-six years represents the time of his most severe suffering and of the accomplishment of the greatest part of his work; there were fluctuations, but he was never well.

4. From 1872 to 1882. A notable improvement in the nervous symptoms which had made life miserable and work difficult marked this period. He was less despondent, worked more easily, and we do not read of the distressing insomnia, exhaustion from conversation, indigestion, and other causes of suffering so frequently mentioned in the preceding years. At this time he developed new symptoms, however, which took the place of those enumerated. These were clearly due to atheromatous and senile changes in the heart and vessels. With advancing years, angina pectoris and accompanying cardiac exhaustion led to his death in 1882.

CAUSES OF DARWIN'S ILL HEALTH

1. *The Voyage of the Beagle.*—The voyage of the *Beagle* was the real beginning of Darwin's intellectual life. It awakened new and exciting interest in a new and congenial sphere and aroused all the dormant energy of his strong mind. No one can read his *Journal of Researches* without realizing how great was his mental activity during those five years and how intensely he was stimulated by his new and vast experience. He was here brought face to face with all the physical and biological problems of the day and he had leisure to ponder on every phase of the phenomena observed, free from the distractions of society and from the influence of other minds. All the conditions then existed most

favorable to the formation of habits of original thought, and *The Origin of Species* first saw light in the cabin of the *Beagle.*

The exercise of his mind, however, was not with Darwin altogether along normal lines; it was the inherent tendency of his nature to overstrain his faculties. His work on the *Beagle* was always overwork; his nervous system was always inevitably and unavoidably overtaxed.

As the naturalist of the expedition all the work in botany, zoölogy, and geology fell upon him. The range of his work was therefore very wide and very exacting; it was his part to collect specimens connected with all these departments, to keep full notes of all phenomena observed, to work with the microscope, and to study the countries and peoples visited. A very severe task this was for a young man of 22 to 25 years; how well he profited by his opportunities his *Journal of Researches* and his after life show.

Besides the mental overstrain involved in such work there were the wear and tear of the physical discomforts of ship life with the fatigue of long land journeys and the exposure to the influence of heat and cold in many different climates. Admiral Lord Stokes, who as a midshipman was one of the *Beagle* ship's company, wrote in 1883:

> Perhaps no one can better testify to his early and most trying labors than myself. We worked together for several years at the same table in the poop cabin of the *Beagle,* during her celebrated voyage, he with his microscope and myself at the charts. It was often a very lively end of the little craft, and distressingly so to my old friend who suffered greatly from sea-sickness. After perhaps an hour's work he would say to me, "Old fellow, I must take the horizontal for it," that being the best relief position from ship motion; a stretch out on one side of the table for some time would enable him to resume his labors for a while, when he had again to lie down. It was distressing to witness this early sacrifice of Mr Darwin's health, who afterwards seriously felt the ill effect of the *Beagle's* voyage.

The physical fatigue to which Darwin subjected himself when on shore at the various ports where the *Beagle* stopped was very great; his incessant activity and the desire to see and know everything impelled him to take long journeys which often involved very great hardships. From Rio he started on a horseback journey of a hundred miles; ten hours were sometimes passed in the saddle without rest, and he arrived at the end thoroughly exhausted with hunger and fatigue. In the same month he rode seventy miles, and in the next month made a journey of eighty miles. Food was difficult to obtain in traveling through this sparsely-settled country, and he often suffered from hunger. In the following year he rode four hundred miles on horseback through an uninhabited country to Buenos Ayres, climbing rugged mountains, exposed to cold and wet, and living for days on meat alone. Seven days after the completion of this journey he began an excursion to Santa Fé, three hundred miles distant. At the end of six days he arrived at his destination, went to bed with headache, and was not well enough to continue.

Every opportunity was seized to climb high mountains, visit distant localities of interest, and to study the general features of the fauna and flora of every country. At one time he traveled for three hundred miles in an open boat off Tierra del Fuego, but he was always stimulated to increased activity, he says, by the novelty of objects and the chance of achieving success. It was this enthusiasm that urged him during the five years of absence to bear every discomfort and to strain every energy to the uttermost.

It is a curious coincidence that, like two other leaders of science, Charles Darwin and Joseph Dalton Hooker, their close friend Huxley began his scientific career on board one of Her Majesty's ships. Huxley writes:

> Life on board Her Majesty's ships in those days was a very different affair from what it is now, and ours was exceptionally rough, as we were often many months without receiving letters or seeing any civilized peoples besides ourselves. . . . But apart from experiences of

> this kind the opportunities afforded for scientific work, to me personally, the cruise was exceedingly valuable. It was good for me to live under sharp discipline ; to be down on the realities of existence by living on bare necessities; to find out how extremely well worth living life seemed to be when one woke up from a night's rest on a soft plank, with the sky for canopy, and cocoa and weevilly biscuit the sole prospect for breakfast; and more especially, to learn to work for the sake of what I got for myself out of it, even if all went to the bottom and I with it.

The effect of these hardships upon health was quite different in the case of the two men, Huxley and Darwin.

2. *Continued Work after the Beagle Voyage.*— The discomforts, fatigues, and mental overstrain of the *Beagle* voyage can fairly be set down as the initial cause of Darwin's subsequent invalidism. Were these causes sufficient to produce such a train of serious and long-continued symptoms ? A closer examination of the details of Darwin's life with the clues here given will convince the most doubting that when he landed in England his nervous system was exhausted and that he was in need of immediate and prolonged rest and recuperation. But he took no such rest. On arriving in London he at once began a life which he speaks of as the most active he had ever spent, when he worked " as hard as he possibly could " although interrupted by frequently recurring illnesses and one long and serious illness. The state of impaired health was now firmly established. From this time the initial causes were continued in the persistent overstrain to which he subjected himself. Although conscious of weariness, he continued to tax his nervous system to the utmost, and even beyond its strength. The necessary result of all this was to multiply many times the original acquired exhaustion and to create a condition that was permanent and from which he never fully recovered.

To give some idea of the sufficiency of the causes in Darwin's life after his return, to cause the symptoms that have been enumerated, I will briefly mention some of the work done by him.

He began almost immediately in July, 1837, having returned in October, 1836, to take notes in relation to the origin of species, and this work was continued uninterruptedly for the next twenty years. He began the book on *Coral Reefs* which caused him twenty months of hard work. He also, while residing in London, read papers before the Geological Society on the *Erratic Boulders of South America*, on *Earthquakes*, and on the *Formation of Mould by the Agency of Earth Worms.* He superintended also the publication of the *Zoölogy of the Voyage of the Beagle.* His three geological books, *Coral Reefs* included, "consumed four and a half years of steady work." After reaching Down he began work on the subject of *Cirripedia;* this work, in two thick volumes and two thin quartos, required eight years to finish. Two years of the eight, however, were lost by illness. From September, 1854, he devoted his whole time to collecting and arranging notes on the origin of species and to reading books, journals, and transactions bearing on the subject. In November, 1859, was published *The Origin of Species;* this book cost him, he says, thirteen months and ten days of hard labor. During this and the following five years he published seven papers on botanical subjects. One paper alone required four months of work. The *Variation of Animals and Plants under Domestication* appeared in 1868 and cost him, he says, four years and two months of hard labor. *The Descent of Man* was published in February, 1871; this book took him three years to write, constant interruptions occurring from ill health and from the frequent demands for new editions and minor works.

During his lifetime Darwin was the author of twenty-three distinct and important works. This does not include new editions and reviews nor the works which he edited and superintended through the press. He also published fifty-one papers and communications to scientific journals. Nine books by other authors contain contributions by him.

Week-days and Sundays were alike; there was no break in the regularity of his life. The pains he took in the preparation of his manuscript was remarkable; composition was not easy with him, and everything was prepared in the rough and then rewritten and the style and phraseology corrected.

Besides the collecting of material and the writing of books he was in constant correspondence with friends, men of science all over the world, and with all sorts and conditions of men to obtain information to help him in solving the question of the transmutation of species. This correspondence involved much fatigue and required much of his time.

Those who have read *The Origin of Species*, *The Descent of Man*, or *The Expression of the Emotions in Man and Animals* can appreciate the time and labor spent by Darwin in the accumulation of facts by extensive reading, correspondence, and observation.

NATURE OF DARWIN'S ILLNESS; INFORMATION DERIVED FROM THE EFFECTS OF TREATMENT

Much light is thrown on the nature of Darwin's illness by the enforced remedial measures that were adopted by himself in order to enable him to continue his work and to prevent a complete breakdown. There is also something to be learned from the effect of the treatment suggested by physicians.

During Darwin's residence of three years and eight months in London he worked very hard, as has been stated, completing his book on *Coral Reefs*, reading extensively, and preparing papers on various scientific subjects; the systematic collecting of facts bearing upon the origin of species was also continued. He also went into general society, attended as regularly as he could the meetings of several scientific bodies, and acted as secretary to the Geological Society. This exacting work and especially the demands of ordinary social life had so bad an effect upon his health that he decided to abandon London and live in the country. Very little is known as to what part a physician's advice played in this important decision, but from the fact that about this time he consulted Sir Andrew Clark, who advised complete rest from work, it is probable that the removal to the country was a measure of compromise, securing a certain amount of rest and freedom from many fatiguing obligations with the ability to continue his projected task. At Down he escaped all the social distractions and interruptions that must have worn upon him so much in city life. There was very little real gain, however, from the change. He adopted a daily routine, and made an effort to go a little into society and to receive friends, but the more serious nervous disturbances that have been spoken of soon appeared. One thing after another in his social life was given up—dinner parties, the visits of friends, and excursions to London—so that finally his life became devoted to scientific work only, which, to use his own words, was "his chief enjoyment and sole employment."

The increase of weakness and sleeplessness with other nervous symptoms and their relation to the number of hours spent in work convinced Darwin that he could not keep up his early habits of work, and that in order to preserve a minimum amount of health it would be necessary to reduce the number of hours given to writing. Acting upon this idea he began the habit, which he continued throughout the remainder of his life, of devoting not more than two to four hours daily to actual work in his library. His son gives the following description of his father's daily routine:

> He rose early chiefly because he could not lie in bed, and I think he would have liked to get up earlier than he did. He took a short turn before breakfast. . . . After breakfast alone about 7:45, he went to work at once, considering the one and a half hour between 8 and 9:30 one of his best working times. At 9:30 he came into the drawing room for his letters—rejoicing if the post was a light one and being sometimes much worried if it was not. He would then hear any family letters read aloud as he lay on the sofa.
>
> The reading aloud, which also included part of a novel, lasted until half past ten, when he went back to work until twelve or a quarter past. By this time he considered his day's work over and would often say, in a satisfied voice, " I 've done a good day's work." He then went out of doors whether it was wet or fine.
>
> The midday walk began by a call at the greenhouse ; then he went

on for his constitutional—either round the sand-walk or outside his own grounds in the immediate neighborhood of the house. . . . He took as many turns as he felt the strength for. . . . Luncheon at Down came after his midday walk. . . . After his lunch he read the newspaper, lying on the sofa in the drawing room. . . . I think the paper was the only non-scientific matter that he read to himself. Everything else . . . was read aloud to him.

After he had read his paper came his time for writing letters. . . . When letters were finished about three in the afternoon, he rested in his bed room lying on the sofa smoking a cigarette and listening to a novel or other book not scientific. . . . The reading aloud often sent him to sleep. . . . He came down at 4 o'clock to dress for his walk and he was so regular that one might be quite certain it was within a few minutes of four, when his descending steps were heard.

From half past four to half past five, he worked; then he came to the drawing room and was idle until it was time (about 6) to go up for another rest with novel reading and a cigarette.

Latterly he gave up late dinner and had a simple tea at half past seven. . . . with an egg or a small piece of meat. . . . After dinner he played backgammon with my mother, two games being played every night. . . . He became extremely animated over these games, bitterly lamenting his bad luck and exploding with exaggerated mock anger at my mother's good fortune. After backgammon he read some scientific book to himself and afterwards there was some reading aloud.

He became much tired in the evening, especially of late years. He left the drawing room about ten, going to bed at half past ten. The restless nights which followed have already been described.

I have quoted in full this record of Darwin's daily routine, as it shows that he lived always under a modified form of rest treatment, just such as is now advised for cases like his.

The day's program was as follows: 7:45, breakfast; 8 to 9:30, work in his study; 9:30 to 10:30, rest in the recumbent position with reading aloud; 10:30 to 12, work in his study; 12 to 12:30, short walk out of doors; 12:30, luncheon; 1:30 to 2, rest in the recumbent position; 2 to 3, writing of letters; 3 to 4, rest lying down in bedroom, with reading aloud and sleep; 4 to 4:30, a short walk out of doors; 4:30 to 5:30, work in his study; 6 to 7, rest in bedroom and reading aloud; 7, simple supper; 8 to 10, in drawing room, games, reading, etc.; 10:30, in bed.

These rules, it will be seen, allow five hours to what may be called work, including letter-writing, this being divided into four periods of an hour to an hour and a half in length; there were three and a half to four hours of rest during the day, lying down, the time being divided into four periods of about one hour each. There were two short outings of one hour or an hour and a half in the morning and about the same time in the afternoon. Eight hours and a half were spent in bed at night.

I have no doubt that this well-ordered routine was the outcome of many a painful experience. Darwin, we may be sure, discovered early that the alternation of work and complete rest was essential to the prosecution of his studies. The problem was how a man suffering with such symptoms could best continue an arduous life of intense mental application during the many years necessary to complete a great task. Darwin certainly solved the problem; the task was completed in spite of suffering and exhaustion.

If this rule of life, which was the means by which he succeeded, was the result of his own decision, it is only another evidence of his good judgment; if it was the advice of a physician, he must have had a wise counsellor.

Something should be said of certain subsidiary parts of treatment made use of by Darwin — his diversions, holidays, etc. Novel-reading was his great recreation during the hours of rest; even to advanced age he never tired of romances. "A novel," he says in his *Autobiography*, "according to my taste does not come into the first class unless it contains some person whom one can thoroughly love, and if a pretty woman all the better." The conservation of this taste for novels is strange inasmuch as he lost during the latter years of his life all love for poetry, even for that of Shakespeare, in whom he had taken intense delight in his earlier years.

"His only outdoor recreation besides walking was riding, which he took to on the recommendation of Dr Bence Jones." He continued riding until two accidents upset his nerves so that he was advised to give it up. He was fond of music and singing and was diverted by them after dinner. He smoked in moderation and used wine sparingly.

Holidays were forced upon him by the frequency of "bad days" or by the swimming in his head, which told him he was being overworked. He usually went to London, Coniston, Grasmere, or Southampton, and was rarely absent more than a week.

Much relief was experienced by visits to water-cure establishments. At first he thought that "a cure had been found, but, like all other remedies, it had only a transient effect on him."

I have reserved until the last one of the most important helps that Darwin had. Without the faithful and untiring assistance of his wife and children no work could have been done; otherwise his life would have been a wreck. These women of the family ministered to his hourly needs, brought him food, read to him, warded off all annoyances, and in his daily life kept in quiet motion the machinery that was absolutely essential to his needs. No tribute to Darwin's accomplished tasks can justly omit to give this credit to those who did so much to preserve his strength during these many trying years.

The conclusion to be drawn from the consideration of the influences favorable to Darwin's health is that he was benefited by lessening his work and increasing his rest. He was enabled to live and to prevent the breaking of his thread of life only by relieving the tension at the critical moment.

CONCLUSION

After this review of Darwin's symptoms and of the conditions that preceded and accompanied them, as well as of the modifications they underwent under the influence of work and rest, there can be but little difficulty in reaching a conclusion as to their nature. This conclusion may be expressed as follows:

1. Darwin was strong and in perfect health up to the beginning of the *Beagle* voyage.

2. The history of the voyage shows that all the conditions were such as to lead to an overstrain of the brain and nervous system and that his expenditure of energy was in excess of the normal supply. The mind was overtaxed with excess of work and the body was fatigued by discomforts and extreme exertions.

3. After returning home he continued to be subjected to mental overstrain during the remainder of his life, a period of forty-six years. There was during this time the intense and sustained application of the mind to a series of investigations requiring the exercise of faculties of the highest order as well as the greatest energy and physical endurance.

4. A state of disease characterized by symptoms connected with the brain and nervous system, the digestion, and the heart was manifested on his return to England. These symptoms were intensified as the years went by, and although sometimes lessened they were never entirely relieved, their fluctuations bearing a close relation to the alternations of rest and work. In their general character they belong to the category of "fatigue symptoms" and were due to the continued overstrain of exhausted nerve cells. They never, however, rendered the cerebrum incapable of the highest intellectual work, although making the accomplishment of this work both painful and difficult.

5. The disease did not consist of any gross lesions of the brain, spinal cord, or nerves, inasmuch as there were no symptoms of any such change. Moreover, the symptoms continued without great alteration during thirty-six years, and under the influence of rest and proper diet improved greatly toward the end of life. This could not have happened had there been any organic nervous disease.

6. The disease was clearly not due to any organic change outside of the nervous system. The chronic indigestion and disturbances in the action of the heart were the usual well-recog-

nized accompaniments of loss of the normal nerve supply to the digestive organs and the heart.

7. The symptoms that preceded death were manifestly due to senile arterio-sclerotic changes, leading ultimately to heart exhaustion and angina pectoris and hastened no doubt by the life of excessive labor. They did not exist, however, before the oncoming of old age. The early symptoms connected with the heart were the result of the disease of the nervous system, not of any organic change in the heart or arteries.

8. The final conclusion is that Darwin's disease was chronic neurasthenia of a severe grade due first to the overstrain of the *Beagle* voyage and second to the life of hard intellectual work begun in 1837 and continued until 1882.

If this diagnosis be the correct one, and of this I think there can be no doubt, could the result have been different from what it was? Was it possible to have prevented all this suffering? The nature of Darwin's work and of Darwin himself necessarily would have made his labor of production a painful one. Such great original thoughts could not have been born without some agony. And yet if Darwin had on his return from the voyage given up all work for one year, two years if necessary, and had lived a life of rest and diversion, free from the daily toil of writing books, correcting proofs, and correspondence, I believe a cure would have been brought about and his subsequent life more filled with joy and alleviation than it was. It will be said with some truth that Darwin's brain could not be made to rest, that in the Alps or on the Riviera he still would have been the observer and worker. But if rest and relaxation had been enjoined upon him as a duty, a relative rest could have been had, free at least from the demands of the printer and of his own exacting conscience.

It is too late now to regret that this course was not adopted and that so much suffering followed its neglect. It only enhances the value of Darwin's work to know that the truth as it came from him was created for us and for all posterity at so great a cost.